SYSTEM AND METHOD FOR TRANSPONDER-ENABLED ACCOUNT TRANSACTIONS

FIELD OF THE INVENTION

The invention relates to the field of electronic commerce, and more particularly to the use of transponder-activated account transactions at point of sale or other locations.

BACKGROUND OF THE INVENTION

The use of electromagnetically-coupled transducers for commercial transaction processing has become increasingly popular in recent times. The advent of compact, inexpensive electronics, transponder-equipped point of sale equipment, and attendant information processing assets have enabled a variety of vendors to offer account-linked transaction systems. Those systems include, for example, subway or other transportation devices, telephone calling devices, and others such as the SpeedPass™ offered by Mobil Corp. for gasoline point of sale transactions. In that and other systems, a receiver emits electromagnetic signals to a device in proximity to a gasoline pump over radio frequencies (RF), activating an embedded transponder within the transaction device. The transaction device is identified by some sort of identification information, which information is then relayed from the point of sale to an offsite information processing facility. However, these types of distributed systems suffer from more than one disadvantage.

For one, transactions made according to that technology require that separate offsite computing facilities be accessed, since the transponder in encoded with information identifying the transponder but not the account information necessary to complete the transaction. Processing times and time to completion of transactions are therefore increased, and the expense of linking and maintaining information processing facilities to service the point of sale request is significant. Moreover, the initiation of new accounts to use such wireless vending points requires backend processing facilitates to enter a new user's account to the remote data processing facility, as well as to encode and associate the transponder with particular new accounts. More streamlined, convenient and flexible transaction technology is desirable.

SUMMARY OF THE INVENTION

The invention overcoming these and other drawbacks in the art relates to a system and method for transponder-activated transactions, generally involving the presentation and sensing of an electromagnetically coupled transponder to an RF-enabled point of sale system. In the practice of the invention, the transponder may be preferably encoded with not merely identifying or serializing information, but also account information which may be used to authorize or record transactions at the instant of sale, so that remote data processing may not be necessary. Users of the transponder of the

invention may link the device to more than one type of account, and activate the transponder using Web or other network-enabled interfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will described with reference to the accompanying drawings, in which like elements are referenced by like numerals.

Fig. 1 illustrates an overall transaction architecture according to one embodiment of the invention.

Fig. 2 illustrates an overall architecture of the invention according to a second embodiment of the invention.

Fig. 3 illustrates an activation architecture for the initiation of user accounts according to the invention.

Fig. 4 illustrates a flowchart of transaction processing according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As illustrated in Fig. 1, in a first embodiment of the invention, an overall point of sale architecture includes a transponder 102 which communicates via an RF link 104 to a receiver 106. The transponder 102 may be or include any of several known electromagnetically coupled devices, generally activated by proximity to an RF-enabled receiving unit, such as receiver 106. Transponder 102 may, for instance, contain an electromagnetic

coil antenna for inductive coupling to receiver 106, thereby being energized with small but sufficient electric current to activate embedded electronics within transponder 102. Those electronics may include memory such as CMOS memory, logic gates, filters for isolating discrete transmission frequencies and other elements known in the art. In one embodiment, transponder 102 may be programmable and able to receive updated programmable instructions via RF link 104, as well as to have electronic memory erased or updated during transactions. Receiver 106 may include an electromagnetic antenna to couple with transponder 102, generally within the range of a few feet of the device.

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In the embodiment illustrated in Fig. 1, the receiver 106 is connected to a point of sale (POS) device 108 for conducting a commercial or other transaction. For instance, the point of sale device 108 may be or include any of several commercially known electronic cash registers or related transaction processing equipment, such as point of sale terminals manufactured by Sharp Corp. or others. In one embodiment of the invention, transponder 102 may be embedded within a personal article for convenience, aesthetic and affinity purposes. In that regard, the invention has been integrated in one implementation within a fully functional watch manufactured by the Swatch Corporation. Embedding in other personal articles, such as key chains, pagers, clothing or other items is also possible.

In the operation of the invention, a user who has subscribed to the account system of the invention may approach the receiver 106 at the point of

sale device 108 to initiate and complete a purchase or other transaction, such as at a restaurant or grocery market checkout line, or other points of sale. In the embodiment illustrated in Fig. 1, transponder 102 contains an encoded transponder ID 110, which may for instance be a 5-digit number or other identifying information. In this embodiment, transponder 102 may also store an account table 112 directly recording account information for the subscribed user of the transponder 102. The account table 112 may be or include, for instance, an indication of an account number, balance, limit and other information for a debit account, a cash account, a credit card account, special premises account for internal use such as by employees, or other account information associated with users of the system.

In the implementation of this embodiment of the invention, receiver 106 is configured to receive the account table 112 and apply an amount being executed at the point of sale device 108 to the account reflected within the account table 112. For instance, a patron who has subscribed to an account according to the system of the invention may approach receiver 106 in a restaurant line and wave a watch or other article containing transponder 102 in proximity of the receiver 106. When transponder 102 comes within range of receiver 106, transponder 102 may be inductively coupled to the coils of an electromagnetic antenna within receiver 106 inducing electrical energy within transponder 102, to establish the RF link 104 with the receiver 106. Upon activation of transponder 102 and radiation of transponder ID 110 to the

receiver 106, the receiver 106 may respond with an acknowledge signal to the transponder 102. The point of sale device 108 may indicate on a display screen or otherwise that a transaction is ready to be commenced. Once the point of sale device 108 generates total amount due for the transaction, the receiver 106 may interrogate transponder 102 to obtain account table information from account table 112 for application to the sale.

For instance, if a patron has purchased a meal in a restaurant line at point of sale device 108, the total purchase price may be validated against available credit, available cash or other account-specified balances within account table 112 for completion of the transaction. Conversely, if the amount of the transaction cannot be validated against account table 112, the point of sale device 108 may indicate "cash required" or another message that transponder validation or authorization has failed. If the transaction amount is validated, receiver 106 enters the transaction amount, recalculates an account balance for storage within account table 112 and transmits the revised account table 112 information over the RF link 104 to the transponder 102. A transaction completion signal may be emitted by receiver 106, which in one embodiment may turn off or decouple the transponder 102 via RF link 104.

Among other advantages, because the receiver 106 and other transaction elements do not need to resort to offsite transaction processing, conduct of the transaction from initiation through approval and completion are completed quickly, often virtually instantaneously to a subscriber at the point of sale. It

may be noted that receiver 106 and point of sale device 108 may be configured to execute a variety of other types of transactions, such as retail checkouts of books, movies or other media, and other transaction events.

In terms of new accounts registration as illustrated in Fig. 3, in the invention a network-based activation architecture may be advantageously employed. As shown in the figure, a new user may access a client work station 118 connected via communications link 120 to a registration server 122. The communications link 120 may be, include or access any one or more of, for instance, the Internet, an intranet, a PAN (Personal Area Network), a LAN (Local Area Network), a WAN (Wide Area Network) or a MAN (Metropolitan Area Network), a frame relay connection, an Advanced Intelligent Network (AIN) connection, a synchronous optical network (SONET) connection, a digital T1, T3 or E1 line, Digital Data Service (DDS) connection, DSL (Digital Subscriber Line) connection, an Ethernet connection, an ISDN (Integrated Services Digital Network) line, a dial-up port such as a V.90, V.34 or V.34bis analog modem connection, a cable modem, an ATM (Asynchronous Transfer Mode) connection, or FDDN (Fiber Distributed Data Networks) or CDDI (Copper Distributed Data Interface) connections.

Communications link 120 may furthermore be, include or access any one or more of a WAP (Wireless Application Protocol) link, a GPRS (General Packet Radio Service) link, a GSM (Global System for Mobile Communication) link, a CDMA (Code Division Multiple Access) or TDMA

(Time Division Multiple Access) link such as a cellular phone channel, a GPS (Global Positioning System) link, CDPD (cellular digital packet data), a RIM (Research in Motion, Limited) duplex paging type device, a Bluetooth radio link, or an IEEE 802.11-based radio frequency link. Communications link 120 may yet further be, include or access any one or more of an RS-232 serial connection, an IEEE-1394 (Firewire) connection, an IrDA (infrared) port, a SCSI (Small Computer Serial Interface) connection, a USB (Universal Serial Bus) connection or other wired or wireless, digital or analog interface or connection.

The registration server 122 may be or include, for instance, a workstation running the Microsoft Windows™ NT™, Windows™ 2000, Unix, Linux, Xenix, IBM AIX, Hewlett-Packard UX, Novell Netware™, sun Microsystems Solaris™, OS/2™, BeOS™, Mach, Apache, OpenStep™ or other operating system or platform.

The registration server 122 may communicate with client workstation 118 to receive preassigned information related to transponder 102, such as transponder ID 110 which may be printed by sticker on a watch or other article housing the device, for entry into a database 126 within registration server 122 and the setting up of an account. The account may illustratively include or be more than one type of account 124a ... 124n, such as cash accounts, debit accounts, credit card accounts, special purpose vending accounts, telephone card accounts, or others. The registration server 122 may validate the

transponder ID 110, and interrogate a new subscriber at client work station 118 to identify or select which one or more of accounts 124a ... 124n the user wishes to associate with the transponder 102.

For instance, the registration 122 may accept a preexisting credit card number for registration with the transponder 102 and execution of future transactions. Once new account information is established, the registration server 122 may communicate via network connection to receiver 106 to update subscriber registration tables within the database 126, receiver 106, point of sale device 108 or other associated hardware to authorize transactions at the point of sale. The paperwork, delay, possibility for error and other drawbacks of paper-based back end account registration is thereby avoided.

A second illustrative embodiment of the invention is shown in Fig. 2, generally involving a processing architecture similar to that of Fig. 1. In this embodiment, a transponder 102 again communicates via RF link 104 with receiver 106 to effectuate point of sale or other transactions. However, in the embodiment of Fig. 2 a portion or all of account table 112 or other information stored in transponder 102 in the first embodiment may be offloaded to economize on the necessary electronics, power consumption and other properties of transponder 102. In the embodiment illustrated in Fig. 2, the point of sale device 108 is additionally connected to a transaction server 116 via communications link 114, for the purpose of authorizing in whole or in part transactions presented for payment using transponder 102. Communications

link 114 may be, include or access communications resources similar to communications link 120.

In this embodiment, part or all of the information of account table 112 may be stored in hard disk or other storage of transaction server 116. Transaction initiation begins in the same manner as the embodiment illustrated in Fig. 1, however, after acknowledgments are exchanged between point of sale device 108 and transponder 102 and a transaction is set up, the point of sale device 108 may communicate with transaction server 116 to validate a transaction amount or other information against account information stored in the transaction server 116.

While this implementation involves additional hardware and communications link 114, if transaction server 116 is co-located with the point of sale device 108, such as in a restaurant or retail outlet, communication delays may be minimal. Furthermore if the transaction server 116 is dedicated to processing transactions only at the site of point of sale device 108 or closely grouped facilities, processing burdens may be comparatively modest. In another embodiment of the invention, transaction server 116 may communicate with remote credit file databases or other information resources before authorizing or completing a transaction initiated over RF link 104 at receiver 106, when circumstances may permit some execution delay to be acceptable. Alternatively, in another embodiment of the invention the point of sale device 108 may perform a preliminary authorization for transactions presented at the

receiver 106, to collect and temporarily store transactions, for instance over 2 or 3 hour periods, for batch processing remotely via transaction server 116. Since the majority of transactions typically reconcile without difficulty, this implementation permits more-immediate completion while still checking on account validations at frequent intervals.

Overall transaction processing is illustrated in the flowchart of Fig. 4. In step 202, processing begins. In step 204, the receiver 106 is presented with transponder 102 within range of electromagnetic coupling, such as inductive coupling. In step 206, transponder 102 is activated, for instance by inductive energization of its circuitry. In step 208 transponder 102 may communicate transponder ID 110, which the receiver 106 acknowledges with an acknowledge signal over RF link 104 in step 210.

In step 212, transaction information such as purchase amount is entered at point of sale device 108, for instance by a check out clerk or other attendant. In step 214, transaction table 112 or other account information may be interrogated to determine whether account balances or other account parameters permit the pending transaction at the point of sale device 108. If the transaction is not validated, in step 216 a "cash required" or other message is signaled at point of sale device 108, and processing proceeds to step 224 whole processing ends.

If the account to be applied to the pending transaction is validated at step 214, in step 218, the point of sale device 108 and receiver 106

communicate with transponder 102 to indicate transaction acceptance, and modify information within account table 112 if appropriate. In step 220, an end of transaction signal is sent to transponder 102 and in step 222, transponder 102 decouples from the receiver 106. In step 224, processing ends.

The foregoing description of the system and method for transponder-activated transactions is illustrative, and variations in configuration and implementation will occur to persons skilled in the art. For instance, while transponder 102 has been described as electromagnetically coupling with the receiver 106, or other types of detection and coupling could be used. For instance, an infrared device, a biometrically enabled or other device may be presented to corresponding detecting apparatus at the point of sale. Similarly, transponder 102 may contain or store other types or forms of information other than transponder ID 110 and account table 112. The scope of the invention is accordingly intended to be limited only by the following claims.